Transportation
written by Brian Rudo on November 01, 2000

One of the most limiting factors of going anywhere in space is that you have to get there. Even in the beginning, there is an incredible challenge: the gravity of the Earth, three times that of Mars and six times that of our closest celestial body, the moon. We have already beaten this obstacle, making it somewhat routine through the Space Shuttle program and Russia's Proton rockets among others. But then we face the greatest challenge of all. Every manned flight going to the red planet must carry enough food, water, air, sources of heat, electricity, fuel, and equipment necessary to survive the months long trip to Mars and back, not to mention the actual stay on the planet itself.

Scientists working for NASA and its counterparts across the world are constantly developing lighter and more efficient ways to provide life support to the humans aboard a future manned mission to Mars or anywhere else in space. And although it is a very laudable goal to develop the perfect life support system, it does not address what very well may be the single most heavy and bulky part of any mission.

Conventional rockets such as used aboard the Apollo missions and the Space Shuttle are fine when you only need to go into low Earth orbit or even to the moon. After that, a faster and more fuel-efficient method must be employed. Although some people would argue that "faster" is not necessarily important, the physical and mental degradation that occurs during prolonged space flight in a confined area cannot be tolerated. Many alternatives have been studied. One such alternative to the traditional rocket is known as plasma rocket. A plasma rocket uses ionized gases to accomplish both of those goals. Such a plasma rocket would be able to adjust its exhaust depending on the needs of the most efficient interplanetary flight plan, unlike conventional rockets used today. In a sense this type of rocket would be able to do the same thing by adjusting its exhaust as a car does by shifting gears.

Franklin R. Chang Díaz first theorized one such engine in the 1980s while working on nuclear fusion technology. His design, the Variable Specific Impulse Magnetoplasma Rocket, or VASIMR, is one of the most promising of all plasma rockets. Among other things, it uses radio antennas to heat the plasma, like a microwave oven, instead of electrodes that become damaged quickly. A VASIMR rocket could also provide many options to the crew, such as aborting easily.

A Rocket

Perhaps the single thing that brought the need for electricity in space to the public's attention was NASA's Apollo 13 mission, or for later generations the cinema production based on the mission, Apollo 13. In that near-disaster, the crew would have died had the mission lasted longer than it had due to the constraints of their batteries. Today, solar power is considered among the best sources for electricity in Earth orbit. Soon after that, it becomes impractical. A VASIMR engine for use on a manned mission to Mars would require 10 megawatts of power. Producing this by solar panels near Mars would require 68,000 square meters of solar panel-hardly practical. Fossil fuels are certainly out of the question, leaving few alternatives to nuclear power.

Ever since the Cold War and such nuclear power disasters such as Chernobyl in Ukraine, nuclear power has carried with it a connotation of disaster and ruin. However, most nuclear power plant disasters have been caused by poor design coupled with poorly trained operators. A nuclear reactor could be safely assembled in space far from human lives, leaving just the finished product to be installed into the spacecraft. If a properly designed VASIMR type rocket were given 200 megawatts of power it could reach Mars in just 39 days.

We may be on the brink of a revolution in space flight. Already, plans are being made to test the VASIMR rocket in a study of the Earth's radiation belts in 2004, as well as helping to combat the effects of atmospheric drag on the ISS. Humans may soon be walking on our second planet other than Earth.

Works Cited:

1) http://www.nasatech.com/Briefs/Sep01/MSC23041.html --